LASER WORDS | MILA | mila˙12048 | B | Dispatch: February 17, 2014 | Journal: MILA
Journal Name | Manuscript No. | Author Received: | No of pages: 17 | TS: suresh

Unpleasantness, Motivational *Oomph*, and Painfulness

JENNIFER CORNS

Abstract: Painful pains are, paradigmatically, unpleasant and motivating. The dominant view amongst philosophers and pain scientists is that these two features are essentially related and sufficient for painfulness. In this article, I first offer scientifically informed characterizations of both unpleasantness and motivational *oomph* and argue against other extant accounts. I then draw on folk-characterized cases and current neurobiological and neurobehavioral evidence to argue that both dominant positions are mistaken. Unpleasantness and motivational *oomph* doubly dissociate and, even taken together, are insufficient for painfulness.

1. Introduction

Painful episodes paradigmatically have at least the following two features, informally identified:

1 Unpleasantness
2 Motivational *oomph*.

The dominant view, at least since Melzack and Wall's gate-control theory revolutionized pain science, is that these features are essentially related and constitutive of painfulness. Melzack and Wall (2008) decisively argued against 'specificity' theories that modeled pain as having dedicated pain receptors, pathways, or centers in the brain. Moreover and to equal acceptance, Melzack and Wall argued that pain is not a simple sensation, but instead has three dissociable and dynamically-interactive components: sensory-discriminative, affective-motivational, and cognitive-evaluative. The affective-motivational component of pain is often considered to both capture 1 and 2 above and to be the *painfulness* of pain. The affective and motivational aspects of paradigmatic pains are taken to be a single feature: painfulness.

This view of painfulness and the essential relationship between unpleasantness and motivational-oomph is as common in philosophy as it is in pain science. Though

The present work was developed thanks to funding from the John Templeton Foundation and the Center for Philosophy of Religion at the University of Notre Dame through the particular support of the 'Problem of Evil in Modern and Contemporary Thought' project administered by Sam Newlands and Michael Rea. I am also thankful for discussion and comments on an earlier draft from Murat Aydede, David Bain, Michael Brady, Robert Cowan, Dan Shargel, an anonymous referee, and to participants in the Pain, Unpleasantness, and Motivation workshop at the University of Glasgow sponsored by the above funders.

Address for correspondence: Philosophy, School of Humanities, University of Glasgow, 67-69 Oakfield Avenue, Glasgow G12 8QQ, Scotland, UK.
Email: jencorns@gmail.com

Mind & Language, Vol. 29, No. 2 April 2014, pp. 237–253.

otherwise holding very different views, Murat Aydede and Matthew Fulkerson (forthcoming) and Colin Klein (Forthcoming) for instance, both characterize pain's unpleasantness by its motivational aspect. David Bain (Forthcoming) recently goes so far as to coin the phrase 'hedomotive content' to flag the essential connection between the unpleasantness and the motivational *oomph* of pain. Moreover, all of these philosophers appear to take this unpleasantness cum motivational aspect to be the painfulness of pain; the very words 'unpleasant' and 'painful' are frequently used interchangeably.

In addition to its dominance in both science and philosophy, that painfulness is an essentially motivating unpleasantness may seem *intuitively* obvious. The painfulness of pain is most naturally understood as the hurt, the nasty 'this sucks' feature of pain; i.e. the unpleasantness. And it may seem impossible to imagine such a state being entirely void of motivational *oomph*. Hard to imagine, that is, an unpleasant pain that one does not feel *some* motivation or other to do something about. The defeat of this inclination is, of course, perfectly imaginable; e.g. you are holding a very hot cup with sentimental value that you opt to see safely to the table before releasing. Here the unpleasantness motivates, but fondness for the cup motivates more. What appears unimaginable, by contrast, is an unpleasant pain with no motivational *oomph* whatsoever.

Finally, note that even pain asymbolics, despite wreaking havoc on other of our intuitions about pain, pose no problem for the dominant view.[1] The pains of the asymbolic at least *appear* not to be painful, and it is precisely the affective-motivational component of pain that seems missing. The pains of the asymbolic are not reported as unpleasant *and* they seem to lack motivational *oomph*. Though the asymbolic may become motivated to do something about his bodily damage for social or other reasons, the pains themselves seem to be entirely unmotivating. In accordance with the dominant view: this lack of motivational *oomph* is to be expected of pains that are not unpleasant.

Despite its predominance in science, philosophy, and even folk psychology, I argue that the dominant view is false. In the following two sections, unpleasantness and motivational *oomph* are characterized, respectively, as immediate hedonic impact and aversive valence. In Section 4, both folk-characterized everyday cases and our best neurobehavioral science are employed to argue that these paradigmatic features of painfulness are dissociable. In the concluding Section 5, I argue that not only do unpleasantness and motivational *oomph* dissociate, they are not sufficient for painfulness. There is more to painfulness than these paradigmatic features—though what more there is must be left for another day. Nonetheless, if the arguments here are correct, the dominant view is false: the affective and motivational aspects of paradigmatic pains dissociate and are, moreover, insufficient for painfulness.

[1] Pain asymbolics report pain when undergoing noxious stimuli, but neither report, nor act as if, their pains are troubling, bothersome, or painful. Precise definitions and explanations of pain asymbolia remain controversial.

2. Characterizing Unpleasantness

Painful episodes are paradigmatically unpleasant and I characterize this feature as *negative hedonic tone*. On my construal, hedonic tone is (minimally) a continuum from pleasure (positive) to displeasure (negative).

Terminology in this area is torturous and verbal disputes may distract. 'Hedonic' is sometimes used restrictively to refer only to pleasure and never to displeasure. It seems good to me, however, to use a single word to refer to the whole continuum of hedonic tone. Similarly, 'hedonic' is sometimes taken to imply a conscious feeling state. I see no reason to think hedonic episodes are necessarily conscious, and reserve the word 'affect' for when they are; affect is conscious pleasure or displeasure—at least one target of 'raw feel'.

A rich characterization of hedonic tone is difficult. Episodes with negative hedonic tone may, on my construal, be caused either by early perceptual processing in any sense modality or by cogitations. Touches, tastes, smells, sounds, propriocepts, sights, and thoughts can all cause hedonic episodes. They are most plausibly expressed by corresponding facial expressions.

Characterizing, for present purposes, will be best aided by clarifying what negative hedonic tone is *not*. I argue in Section 3 that negative hedonic tone dissociates from, and so is not appropriately characterized as, motivational *oomph*, but it should first be distinguished from three other popular candidate characterizations: homeostatic disutility, dislike, and aversion (un-desire).

Homeostasis includes any regulatory system that maintains a stable physiological state by monitoring states of an organism and correcting them relative to a built-in value or (more plausibly) range of values. A feature is under homeostatic control if the feature is monitored, compared with a built-in value, and subject to processes enacted to adjust the feature when necessary. The most plausible candidates for homeostatic control are thirst, hunger, internal temperature, and various nutrient levels.

The most compelling case for the centrality of homeostasis to hedonics is allesthesia. Allesthesia is a change in hedonic tone caused by a type-identical stimulus as a function of an organism's antecedent state. The phenomenon is robust—especially for those features most plausibly under homeostatic control. When one is very cold, a fire is pleasant, whereas when one is very hot, a fire is unpleasant. When extremely hungry, a disliked food is delicious. The key thing to note is that allesthesia is not a function of a change in the stimulus type, but of the internal state of the organism.

Allesthesia has suggested to some that hedonic tone is *exhausted* by homeostatic (dis)utility. On this view, pleasure and displeasure are determined solely by the utility of a stimulus given an organism's antecedent states. Thus, Cabanac (1979) baldly claims that '[w]hen a stimulus represents something which is useful to the organism's homeostasis, it gives pleasure; when it represents something dangerous or useless to the organism, it gives displeasure or is found indifferent' (p. 17). Note that the claim here is constitutive and not merely causal; e.g. the hedonic impact

of drinking water consists in its homeostatic contribution. Upon reviewing some of his extensive research on allesthesia, he concludes: 'Pleasure therefore indicates a useful stimulus and simultaneously motivates the subject to use it' (p. 22). Similarly, Panskepp (1998) claims that: 'A general scientific definition of the ineffable concept we call pleasure can start with the supposition that pleasure indicates something is biologically *useful*' (p. 182). After explicating homeostasis and surveying experiments on allesthesia in rats, Panskepp concludes: 'All of these experiments point to one overwhelming conclusion: Pleasure is nature's way of telling the brain that it is experiencing stimuli that are useful—events that support the organism's survival by helping to rectify biological imbalances' (p. 182). Here again, note that Panskepp's comment occurs within his struggle for a definition; the idea is that pleasure just *is* homeostatic utility.

The phenomenon of allesthesia should not be denied, but its explanatory power should not be exaggerated. Recall that a feature is homeostatically controlled only if it is continually monitored and subject to stabilizing processes when errors are detected. It is implausible that *every* stimulus capable of causing a hedonic episode exhibits features subject to homeostatic control. Implausible, that is, that (dis)pleasure is exhausted by homeostatic (dis)utility.

Consider the hedonic episode caused by listening to your favorite piece of music. Is it at all plausible that I have a homeostatic mechanism that continuously monitors my Chopin Cello Sonata in G minor levels? Is it any more plausible that I have a homeostatic mechanism that continuously monitors my *music* levels? How could such a mechanism have evolved and how could it be realized? What are the detectors constantly monitoring music levels? What are the built-in range of values? Counterexamples proliferate.

A credible role for homeostasis is *modulating* hedonic episodes—not constituting them. Hedonics are presumably modulated by a great many of my internal states, but this does not show that they are *constituted* by these states. My thoughts, my mood, my day, the weather, how tight my shoes are: all these may modulate any given hedonic episode, but they do not constitute the hedonics of the episode.

Though a more plausible view, negative hedonic tone is also not constituted by dislike. This position has had numerous defenders and was stated clearly by Hall (1989) in a discussion of pain in particular: 'The unpleasantness of pain sensations consists in their being disliked. . . . to say that a sensation is unpleasant is to say that it is the object of dislike' (p. 646). This traditional view fails for the same reason as Schroeder's (2004) more contemporary, and complex, desire view. I evaluate both together.

Schroeder argues for what he calls 'the representational thesis of hedonic tone'. The final version is stated:

> To be pleased is (at least) to represent a net increase in desire satisfaction relative to expectation; to be displeased is to represent a net decrease in desire

> satisfaction relative to expectation. Intensity of pleasure or displeasure represents degree of change in desire satisfaction relative to expectations (p. 94).[2]

Schroeder is clear that he does *not* intend to identify the 'core process that underlies feelings of pleasure and displeasure'; rather, his target is the conscious feeling, or experience, of these. Schroeder's pleasures and displeasures are cortical, cognitive, conscious, and person-level.

A classic objection to the characterization of hedonics as *dislike* applies equally to Schroeder's desire view: it gets the order of explanation wrong. My unpleasant experiences are not unpleasant *because* I dislike them; rather, I dislike them because they are unpleasant. Schroeder deals with a similar objection to his own account:

> The critic may then pose a difficult choice. Tastes are the sort of thing that tempt one to say 'I want it because it pleases', while for desires 'it pleases because I want it' is the natural order of explanation. If the similarities between desires and pro attitudes are so great, then one order of explanation must triumph over the other … one cannot make use of the concept of pleasure in saying what it is to be a desire, if one also wishes to appeal to the concept of a desire in explaining what pleasure is—ontological circularity looms (p. 100).

Schroeder responds to the objection by denying the natural account of taste. He denies that we desire a pleasant-tasting food *because* it gives pleasure; rather, food gives pleasure because we have a desire for the food that is satisfied when it is eaten. Schroeder is forced to go this way since he has made pleasures and (the representation of) desire-satisfaction (relative to expectation) co-extensive. Desires and pleasures must always stand in the same relation, and while it may seem plausible in some cases, he (rightly) finds it implausible that pleasure is what is desired in *every* case. The seeming platitude that we *sometimes* desire things because they are pleasant could be maintained, however, if desires and pleasures were recognized as causally, contingently, related.

Both Schroeder's desire theory and theories characterizing hedonics as liking and disliking are incompatible with not just a single folk platitude, but a number of our everyday descriptions and explanations. Sometimes we desire things because they are pleasant and sometimes we un-desire things because they are unpleasant. Sometimes we dislike things because they are unpleasant and sometimes we like things because they are pleasant. If either a net representation of desire satisfaction or (dis)like are identified with (dis)pleasures, then we must deny what seems obvious: that these states are sometimes *caused* by hedonic episodes. Do we really never desire

[2] This '(at least)' seems intended to allow for the possibility that being pleased has an additional, non-representational, qualitative feature. Even if this feature is granted, all the arguments presented here apply, as increases in desire satisfaction relative to expectation are nonetheless taken by Schroeder to be both necessary and sufficient for (un)pleasantness.

something because it is pleasant? Do we really never dislike something because it is unpleasant? My dislike of pumpkin and I demur; I dislike it because eating it is unpleasant.

Schroeder thinks that his account of (un)pleasures, aimed at the conscious, cognitive, person-level is harmonious with Berridge's (e.g. Berridge and Robinson, 2003, and Berridge, 2004) alternative account of hedonic processes aiming at the non-conscious 'core level'. Berridge's account will be taken up in some detail below. Note now, however, that this disagreement in characterizing hedonics is not entirely verbal and more than consciousness is at stake. Whether hedonic tone is a *cognitive* phenomenon is a substantive, distinct, question. On Schroeder's view, it is. On Berridge's view, hedonic episodes are not themselves cognitive, and their connection to any particular cognitive state is contingent. We do best, here, to follow Berridge.

Desires and aversions (and the representations thereof), as with likes and dislikes, are cognitive and rationally integrated with one's other mental states, but immediate hedonic impact is not. Consider that we sometimes like and desire experiences that we nonetheless identify as having a negative immediate hedonic impact. Indeed, in some cases we may even like an experience *because* of its negative hedonics. So, for instance, I may like hot peppers *because* they burn in a way that I nonetheless recognize as unpleasant. Similarly, I may like exercising *because* I find the soreness in my muscles gratifying. The soreness and the burn of the peppers may be unpleasant, but liked and desired. One could counter that I must actually dislike and un-desire these experiences—but what independent reason is there to say that? If you ask me, I will say that I like and desire these experiences, and my behavior will follow suit. Of course, they may well be some *positive* hedonic episode simultaneously occurring responsible for causing my like and desire of these activities. Nonetheless, insofar as I do *not* dislike or un-desire them, there is an immediate, negative hedonic impact that these cognitive accounts leave unaccounted. Similarly, I may dislike and un-desire an experience while still recognizing its immediate, positive hedonic impact; e.g. being held down and forced to take heroin.

What is true is that unpleasant episodes often cause me to dislike both the episode itself and the stimulation that caused it. Typically, I like and desire pleasant things and being pleased and I un-desire and dislike unpleasant ones and being displeased. Often, I am pleased when I engage in activities I like and when (I represent that) my desires are satisfied. These things, however, are only contingently related. Unpleasant experiences often cause, but are not constituted by, dislike. Pleasant experiences often cause, but are not constituted by, (the representation of) desire satisfaction.

3. Characterizing Motivational *Oomph*

Painful episodes are paradigmatically motivating—they have, what we might colloquially call, motivational *oomph*. I characterize this feature below and label it

aversive valence. On my construal, aversive valence is (minimally) a signal in one's motivational system whose opposite I dub *appetitive* valence.

Terminology is again somewhat torturous. Multiple names are used to refer, if not to my aversive valence, to a remarkably similar phenomenon. It appears, for instance, in Berridge's (2003, 2004) work as the oppositely-valenced 'wanting', and in Rolls's work as a punishment signal (1999).

As with unpleasantness, the motivation *oomph* of painfulness is not controversial, but its characterization is. Why aversive valence?

Valence itself is a highly disputed concept. Perhaps all that is fully agreed upon is that it identifies a polarity of 'positive' and 'negative'. Contemporarily, valences are most often posited to distinguish positive and negative emotions. Colombetti (2005) and Solomon (2003) are among those concerned with the utility of the notion for this purpose. Both argue that there are multiple positive and negative features of emotional episodes and conflating them under a seemingly simple dichotomy is inappropriate. Moreover, they maintain that emotions as a class are not polarized. In short, they argue that construing emotions as valenced is both physiologically and psychologically implausible.

In response to these criticisms, Prinz (2010) argues that his own conception of valence succeeds where others have failed. The idea, in sum, is that:

> ... negative emotions are emotions that contain a component that serves as an inner punishment—a kind of signal that says, 'Less of this!' Positive emotions are those that contain a component that serves as an inner reward—a signal that says 'More of this!' (p. 10).

Thus, a valenced emotion '... signals the demand for its own cessation or continuation' (p. 10).

Prinz here identifies a biologically plausible candidate for valence. It appears to be co-extensive with Rolls's reward and punishment signals and Berridge's 'wanting' and 'not wanting'. Rolls sometimes speaks of these signals in terms of the dopaminergic system sending 'Go' or 'Preparation' signals that 'lead to' the initiation of behavior (e.g. 1999, p. 178). When discussing 'wanting' and 'not wanting', Berridge often speaks in terms of 'motivational valence'.

Regardless of Prinz's success in vindicating valence for a theory of *emotion*, its utility in characterizing the motivational *oomph* of painfulness may remain. Colombetti's and Solomon's objections to the use of valence in emotion theory are inapplicable to its use here. If Prinz is correct about valenced emotions, then there is a component that all negative emotions *and* painfulness share: aversive valence. If incorrect about emotions, the characterization of the motivational *oomph* of painfulness remains untainted.

It is again helpful to make clear what this feature—aversive valence—is not. I will later argue that it dissociates from unpleasantness. The motivational *oomph* of painfulness should nonetheless here be distinguished from two other popular candidates: motivations and imperatives.

Consider first motivations. Motivations are cognized, intentional states. Moreover, as understood in behavioral neuroscience they require goal-directedness and flexible, means-end reasoning.[3] Though there is good reason to acknowledge a motivating feature of painful episodes, there is no good reason to include a motivation—and good reason not to.

Some painful episodes involve no motivations. If I place my hand on a hot stove, I will typically undergo a painful episode. I will also typically immediately recoil. There is, however, no reasoning here about what to do about the situation. No cognized goal-directedness. No flexibility. There is no need for a motivation. Nonetheless, there is a painful episode. Moreover, there is good reason to think that there was a motivating signal: a quick 'less of this!' that likely expressed itself in action preparedness. But a motivating signal does not a motivation make.

Conflating motivations and motivating signals is tempting since the former are typical consequences of the latter. And indeed, painful episodes typically *cause* motivations. Platitudinously, when we *are* motivated to end our painful episodes it is often partly *because* they are painful. We commonly cite painfulness as the *explanation* of our motivations; the motivation itself is not a feature, but a typical consequence. A signal ('less of this!') captures the motivating aspect of painful episodes nicely, and can explain why motivations are typically, but not necessarily, caused. Motivational *oomph* should be characterized as aversive valence—a motivating signal—but not as a motivation.

It may be countered that I paradigmatically have some disposition to end the episode if it is painful. Dispositional checks have to get mechanistically-cashed somewhere, however, and aversive valence is good currency. Whether a motivation is caused by the aversive valence depends on our other psychological states and situation-specific features of the situation. The motivating signal, that is, disposes one to form a motivation.

Consider now imperatives. Aversive valences may be thought imperative-*like* in that they are an important, sometimes vital, signal. Moreover, like imperatives, aversive valences often *cause* motivations that facilitate action. Imperatives, however, are commands to do something—and in this way aversive valences are *not* like imperatives. Aversive valences do not tell the organism *to do* anything. What to do is cognitively determined, further downstream—again, in conjunction with the agent's other mental states and specific features of the situation. An agent may decide to do something in response to a painful episode, but that decision—about whether to do anything, and if so what—is not *itself* a feature of the painfulness.

Imperative theories of pain have recently come to the fore. Klein (Forthcoming), for instance, presents the imperative theory as an attempt to save intentionalism about pains and other bodily sensations. The claim is that bodily sensations *do* have intentional content: imperative content. In the case of pain, the imperative

[3] For discussion and references see Berridge, 2004, p. 187 and Rolls, 1999, p. 3.

content is negative, such that '[w]hat unifies ... pains is the imperative that I stop doing what I am doing; their content is a proscription against action' (p.7). In addition to saving intentionalism, the imperative content of pain is supposed to explain its motivational aspect which is itself taken to explain its unpleasantness. This makes Klein's view a particularly strong version of the dominant view that takes motivational *oomph* and unpleasantness to be essentially linked.

Among other criticisms of the imperative view, however, Bain (2011) convincingly argues that the motivational aspect of pain is not explained by imperative content. As Bain points out:

> ... the idea [according to pain imperativism] is that pain-commands *constitute* avoidance urges. But it is hard to see how this could be. Urges are surely *never* constituted by commands. ... It is precisely because commands *don't* constitute urges that you can receive commands you have absolutely no urge to obey (p. 10).

The negative imperatives taken by Klein and the imperativists leave unexplained any motivation to heed those imperatives—they leave unexplained, that is, the motivational *oomph* of painfulness.

This criticism does not apply to the account of motivational *oomph* offered here. It is taken to be a virtue of this account that sometimes we are *not* motivated by painfulness—even as sometimes we are not motivated by commands. Sometimes, of course, we are. Whether a command causes one to form a motivation depends on the rest of one's mental states and other specific features of the situation. So too, for motivating signals. Bain's objection *would* apply if motivations, and not just motivating signals, were features of painfulness—aversive valences do not constitute motivations anymore than imperatives do. As argued above, however, the claim that motivations are features of painful episodes should be rejected in favor of the view that the motivating signals of painful episodes typically *cause* motivations.

Neither motivations nor imperatives are features of painful episodes; rather, painful episodes feature a motivating signal. A motivating signal that, as Bain points out, does not itself constitute any motivation *to do* anything. Nonetheless, the signal, 'Less of this!', often *causes* a cognized motivation.

4. Dissociation

In this section, I argue that negative hedonic tone (unpleasantness) and aversive valence (motivational *oomph*) dissociate. It should be directly admitted that they typically come together; rarely does an episode with negative hedonic impact or aversive valence lack the other. That these features of painful episodes often co-occur, however, is insufficient support for the dominant view that they are essentially linked.

Two lines of evidence for establishing dissociation will be considered: folk-characterized cases and neurobiological evidence. Both must be fused together. Philosophers are crafty, and everyday cases can often be offered and interpreted to fit one's preferred theory. Without *some* folk-characterized conception of the relevant phenomena, however, scientific data is without illuminating interpretation. We must have *some* idea of what we are looking for when we run rats and scan brains. Though both lines of evidence are controversial, some folk-characterized cases are most naturally interpreted as evidencing dissociation between aversive valence and negative hedonic tone, which is further supported by our best neurobiological evidence.

The first set of cases worthy of consideration are pleasures and displeasures with seemingly *no* motivational disposition in the neighborhood. Some such are presented by Schroeder (2004); e.g. induced, unpleasant, guilt. Schroeder argues that it is unclear how we might be motivationally disposed in these cases. Adequately distinguishing motivations from motivating signals, however, reveals that these cases are weak support for dissociation. There may be a 'less of this!' motivating signal whenever, for instance, one feels guilty. This may be so even if, as Schroeder argues, there is nothing that it makes sense *to do* and so no consequent motivation. Aversive valences are motivating signals and not themselves motivations—though again noting that motivating signals typically cause motivations in conjunction with one's other mental states and situation-specific features of the environment. When motivatings and motivation are adequately distinguished, the cases presented by Schroeder do not provide clear support for dissociation.

Cases of masochism and self-injurious behavior (SIB) are more plausible dissociative candidates. These cases are much discussed and all interpretations are highly controversial. Perhaps this should not be surprising. A perusal of case studies illuminates that not all masochists or SIB-engagers have the same experience—or, at least, they do not describe their experiences with relevant congruity. Some, however, plausibly seem to not only undergo episodes with negative hedonic impact without aversive valence, but with *appetitive* valence. If this interpretation is correct, in these cases 'more of this!' messages are sent in response to stimuli that simultaneously cause an immediately unpleasant episode. But again, this interpretation may never *be* correct. It may be countered for each case either that some other feature of the experience causes the appetitively-valenced signal (e.g. the thought that one is being deservedly punished) or that there is actually no immediate, negative hedonic impact (e.g. the relevant experiences are actually not at all unpleasant). Though I find both alternatives strained in *some* cases, more data is needed. SIB and masochism provide only inconclusive support for dissociation.

Though also disputed, the everyday cases most naturally interpreted as dissociative are the experiences of addicts. Consider first the heavy smoker who regularly has cigarettes that are experienced as unpleasant. Having smoked a number of years myself, there were some cigarettes that I at least *seemed* to experience as unpleasant while nonetheless feeling highly motivated to inhale deeper. The smoker, on these occasions, seems most naturally described as being (even highly) motivated to

inhale *despite* the unpleasantness of the experience. As motivation and motivating have been argued to be importantly distinct, it may be countered that the smoker should be interpreted as motivated, but lacking any appetitively-motivating signals. This is implausible. Unlike motivating signals with no candidate motivations, the presence of motivations makes likely the motivating signals that typically cause them—and there is no independent reason against positing them here. A more plausible counter, as with the masochist and SIB-engager, is that there is some *other* feature of the situation responsible for the appetitively-valenced signal. Even if this is granted, what independent reason is there to posit an *aversive* valence? Even if the appetitively-valenced signal can be otherwise explained or explained away, according to the dominant view the unpleasantness entails some motivational *oomph* to avoid. This is unfounded both behaviorally and first-personally in the case of the smoker's unpleasant cigarette. If unpleasantness does not dissociate from motivational *oomph* there must be *some* aversive valence here, but it is hard to believe there is.

If the smoker is unconvincing, consider yet other addictions.[4] Often, the stimulus-type is most naturally interpreted as causing the addict increasingly less and less pleasure (eventually, negative hedonic impact) while motivational *oomph* grows increasingly stronger (appetitive, and not aversive, valence). Part of what is tragic about addictions is that the addict at least *seems* driven to engage in behaviors that they at least *seem* no longer to find pleasant. A biologically plausible theory of addiction that respects these seemings has been offered by Berridge (2004).

Berridge's work is both the most impressive and accepted line of neurobiological support for the dissociation between negative hedonic tone and aversive valence. The key experiments involve dissociating what he calls 'liking' from 'wanting'. Berridge (2004) argues that while they usually co-occur, '. . . a split may sometimes occur between the incentive processes of ''liking'' and ''wanting'' because these two components of reward have different brain mechanisms' (p. 194). Berridge's 'liking' and 'wanting' are consistently presented in scare quotes because they are taken not to correspond well to the folk notions of liking and wanting—which he takes to be necessarily both cognitive and conscious (p. 196). Berridge's own intended referents are instead non-cognitive, not-necessarily conscious, core processes. Thus, he writes:

> 'Liking' is essentially hedonic impact—the brain reaction underlying sensory pleasures—triggered by immediate receipt of reward such as a sweet taste (unconditioned 'liking') . . . 'Wanting' or incentive salience is the motivational incentive value of the same reward. . . . 'Wanting' is purely the incentive motivational value of a stimulus, not its hedonic impact (p. 194).

[4] Similar considerations apply to compulsions.

Berridge's 'wanting' nicely aligns with appetitive valence (as against its cognitive consequences of motivation or *wanting*) and his 'liking' with positive hedonic tone (as against its cognitive consequences of *liking*).

Berridge (2004) surveys a number of experiments that he takes to support the *incentive salience model* of reward. According to the model, reward typically involves both positive hedonic impact ('liking') and incentive salience ('wanting'). These components of reward, however, are subserved by distinct, dissociable mechanisms. Thus he says bluntly: 'Hedonic 'liking' by itself is simply a triggered affective state—there is no object of desire or incentive target, and no motivation for reward' (p. 195).

Though space precludes extensive experimental review, a key study in support of the model, and its entailed dissociation, is Peciña *et al.* (2003).[5] Wild-type mice (i.e. typical as opposed to intentionally altered or bred) were compared with mutant, hyperdopaminergic mice (i.e. mice doped-up on dopamine). The mice were evaluated across two tasks: spontaneous food and water intake and a rewarded runway task (the mice run from a start box, down a runway, to a reward). Motivational incentive, or 'wanting', was measured in the spontaneous condition by intake. In the rewarded runway task, 'wanting' was measured by multiple factors including latency leaving the start, reaching the goal, and eating upon arrival, along with pauses on the runway, direction reversal, and running speed. Dopaminergic mice had significantly increased 'wanting' as evaluated by all measures in both tasks. Moreover, the doped-up mice learned the task quicker. 'Liking' was measured by independently validated orafacial responses (the things they do with their tongues and how they lick their paws). In contrast to 'wanting', 'liking' was consistent across wild and dopaminergic mice—indeed 'liking' as evidenced by these measure very slightly *decreased* in the dopaminergic mice despite consistent, increased 'wanting'. Thus, they write in summary:

> 'Liking' reactions in the taste reactivity test appeared to remain sensitive to differences in the hedonic impact of sweetness for these mice. For example, more positive hedonic reactions were elicited overall by the concentrated 1.0m taste [the sweetest] ... than by the most diluted solution, but mutant and wild-type mice did not differ in their number of 'liking' reactions at low and moderate sucrose concentrations, and the highest sucrose concentration actually elicited fewer positive hedonic reactions from mutants than from wild-type mice. ... The incentive salience hypothesis [see above] does not actually require that 'liking' reactions be reduced in hyperdopaminergic mutants, only that they not be elevated. However, a decreased 'liking' reaction helps dramatically illustrate the independence between 'wanting' and 'liking' predicted by the hypothesis (p. 9401).

[5] See also Faure, Richard and Berridge, 2010.

If the incentive salience model is correct, then hedonic impact and motivating signals can be independently manipulated; i.e. they dissociate.

As dopamine is the most credible realizer of valenced, motivating signals, a word about this chemical is in order. For some time, dopamine was thought to be the pleasure-realizer in the brain—corresponding to immediate hedonic impact. There is growing consensus among psychologists and neuroscientists that this is not so; though the activity of the dopaminergic system is clearly indicated in motivating both rewards and punishments, it is now thought insufficient for and dissociable from hedonic impact. The evidence has been accumulating, and there appears to be no one in behavioral neuroscience still supporting the idea that dopamine is the pleasure-realizer. All concur, however, that it undergirds motivating signals. If dopamine and its activity are distinct from hedonic impact, this further supports dissociation.

One may object that though dopamine and hedonic impact may come apart in *reward* (pleasures) that does not show that they dissociate in *punishment* (displeasures). It should be admitted that there is less clarity about the role of dopamine in punishment than reward, but all is not lost. Panskepp (1998) reviews evidence linking dopamine release to aversive events—though the dopamine's role remained vague at the time of his writing (p. 377). Similarly, in a review of the role of dopamine in reward, Schultz (2002) notes that dopaminergic responses have also been identified in punishment (i.e. motivating noxious stimulation) (p. 242). As a result of recent experimental work on fear, Berridge (personal communication) holds that there are oppositely-valenced mechanisms of punishment complimenting those of reward posited in the incentive salience model. In reviewing a number of studies, Rolls (1999) concludes that '… dopamine release occurs not only to rewards … but also to aversive stimuli such as aversive stimulation of the medial hypothalamus, foot shock, and stimuli associated with foot shock' (p. 177).

All told, there is wide consensus based on good evidence that dopaminergic responses are at least involved in sending motivating signals in both reward and punishment. It would, moreover, be strange if *aversive* dopaminergic signals did *not* dissociate from hedonic impact while *appetitive* dopaminergic signals *do*. Of course, the actual is sometimes strange. There is, however, no *reason* to posit this asymmetry. It appears, instead, to be a purely theoretically motivated move: to retain a necessary connection between negative hedonic impact and aversive valence in the face of the evidence that positive hedonic impact and appetitive valence dissociate. This is not a *proof*, but insofar as dopaminergic motivating signals decouple from positive hedonic impact and are known to be involved in punishment, the claim that motivating signals decouple from *negative* hedonic impact should be taken to at least receive support.

Finally, it should be admitted that the exact function of dopamine is not entirely settled. In addition to its motivating role, dopaminergic signals are also respectably hypothesized as error detection signals for the facilitation of learning. The dopaminergic system is here interpreted as tracking actual rewards and punishments and comparing them with those expected—not merely motivating. This dopaminergic

role is emphasized in Schroeder's theory of reward (2004). To deal with this functional duality, McClure, Daw and Montague (2003) have offered their *temporal difference model*. The model posits a computation relating the dopaminergic functioning of incentive salience ('wanting', motivating signals) to its function in learning and action selection (comparing actual and expected rewards and punishments). Schultz (2002) similarly purports to bring unity by distinguishing continuous as against phasic signaling; the former undergirding motivatings, and the later facilitating learning. In short, even if recent evidence suggests that dopamine underwrites more than motivating signals, none of these additional functions undermine its established role in underwriting motivating signals.

Taken together, the best interpretations of both lines of evidence support dissociation. Despite the lack of clarity concerning its other functions, it is undisputed that one key function of the dopaminergic system is in sending motivating signals. The idea that dopamine realizes pleasure has been abandoned and the dissociation between motivating and pleasure embraced. Though admittedly less well established, the evidence supports dopamine's motivating role not only in reward, but in punishment.

It may be objected that separating hedonic impact and aversive valence renders the *function* of hedonic impact unacceptably mysterious.[6] Three function-related worries might be raised.

First, one might object that the essential connection between unpleasantness and motivational *oomph* is part of folk-psychology—one of the platitudes with which theorizing about the mind must begin. In response: it is indeed platitudinous that we are typically (not) motivated by things that (dis) please us, but to deny essentiality is not to deny these platitudes. I see no reason to think the folk are concerned with essences or essential connections—despite great philosophical interest in both.

Second, one may worry about function in respect of the engineering/adaptation issue: what's the evolutionary story? In response: frankly, I don't know. Neither, so it seems, do the scientists. What I do know is that if hedonics and motivating signals are distinct and dissociable, then the evolutionary story will need to respect that truth.

Third and finally, dissociation might appear to imply hedonic epiphenomenalism: what does being (dis)pleased *do* if it does not provide motivational *oomph*? In response: being (dis)pleased usually, but not always, causes *oomph*. That hedonics is only contingently connected to motivational signaling, as the incentive salience model entails, does *not* entail that the identified contingent connection is not important for understanding the functional profile of hedonics. Moreover, note that hedonics at least *seems* to have additional (presumably equally contingent) connections that may be important for understanding its functional profile. Hedonics episodes also at least appear to have characteristic effects on memory, attention, problem solving, and more. Denying an *essential* connection to any of these, including motivational signaling, is not to embrace epiphenomenalism.

[6] I am grateful to Murat Aydede for pressing this objection.

Hedonic episodes often *are* motivating and it is this typicality that seduces one into making essentiality claims. Essentiality claims are, however, incompatible with not only natural interpretations of non-typical cases, but our best evidence about how to model the mechanisms underlying negative hedonic tone and aversive valence. There are almost certainly causal links between hedonic episodes and motivational *oomph*, but proper identification of these links is only possible if we recognize them as dissociable.

Before concluding this section it is worth emphasizing, as discussed in Sections 2 and 3, that the negative hedonic tone and aversive valence of interest here are non-cognitive and not necessarily (in the case of aversive valence, perhaps *never*) conscious. Many writers discussing hedonics and motivations are interested only in the associated conscious, cognitive, person-level phenomenon. A clear example of this was Schroeder's account of (un)pleasures discussed in Section 2. These types of accounts not only ignore the underlying core processes that best explain the observed phenomena, but in doing so they get the orders of explanation wrong. (Un)pleasantness often *causes* us to (un)desire or (dis)like the activities (represented as) engendering it. The account of unpleasantness as the (non-cognitive, not necessarily conscious) negative hedonic tone presented here can preserve this. Motivational *oomph* will often cause us to form a motivation. The account of motivational *oomph* as the (non-cognitive, not necessarily conscious) aversive valence presented here can preserve this.

It is these non-cognitive, non-conscious components that I have argued dissociate. As such, the dissociations argued for here are independent of any particular theory of consciousness and therefore compatible with a variety of explanations and theories of how we *experience* our pleasures and displeasures and *what is it is like for us* to be motivated. Whatever one's theory of conscious experiences: negative hedonic tone and aversive valence should be modeled as dissociable.

In summary: in the face of the evidence, in conjunction with what seems the most natural interpretation of a number of admittedly controversial cases, in the paucity of reasons for accepting an essential connection as against a typical one, and independent of our preferred theory of consciousness: we should accept that hedonics and aversive valence decouple. Our best theory of painfulness, then, will keep the paradigmatic features of unpleasantness and motivational *oomph* clearly distinct.

5. Insufficiency

Not only do the unpleasantness and the motivational *oomph* of painfulness dissociate, but also they are insufficient for painfulness. Though 'painfulness' and 'unpleasantness' are often used interchangeably in the pain literature, a number of common episodes feature both negative hedonic tone and aversive valence despite not being painful.

Consider a bout of extreme nausea. The room rapidly spins as one sweats, struggles to breathe normally, and accepts that vomiting is imminent. Paradigmatically, such

an experience will be unpleasant, and have motivational *oomph*. Moreover, bouts of extreme nausea appear to have these features just as they have been characterized here: extreme nausea has a negative hedonic tone and aversive valence. It is nonetheless not painful. Similar considerations apply to annoyance or disgust: these experiences are unpleasant and motivating, but they are not painful.[7]

I can think of three ways that sufficiency may yet be salvaged. First, one might try countering that extreme nausea *is* painful. This reply is neither ludicrous nor satisfying; extreme nausea does not *seem* painful to *me*. A second, similar, option is to repudiate the adequacy of the folk taxonomy—including the version of it I employed in introspection to find myself unsatisfied with option 1. Not only does nausea not seem painful to me, but the folk do not talk this way. Our objector may admit that as things stand the folk notion of painfulness excludes nausea (and annoyance, and disgust), but that our best theorizing about painfulness reveals that the folk notion requires revision. This option is more plausible, but is also unsatisfying. It is better to stick with the folk taxonomy if at all feasible. Moreover, this option leaves one with the suspicion that there is still something unaccounted for *in virtue of which* the folk do not include nausea as painful. Finally, it might be denied that extreme nausea has one of the identified features. Denying unpleasantness is the least plausible. Again, extreme nausea certainly *seems* unpleasant to *me*. Deny aversive valence? As with addictions, given that a motivation to do something is typically generated in these cases, this seems implausible. One is (defeasibly, of course) motivated to end the nausea-bout: vomit, drink water, lie down, and so forth. This suggests an aversive valence causing the formation of the motivation. There is, it appears, simply more to painfulness than unpleasantness and motivational *oomph*.

The further conditions of painfulness must wait, but the morals of *this* story are (1) unpleasantness (negative hedonic impact) and motivational *oomph* (aversive valence) dissociate; and, (2) there is more to painfulness than their conjunction. The dominant view is false.

It is worth noting in closing that rejecting the dominant view may have *practical* benefits. Improved treatment may be distantly in the offing. Pain asymbolics, for instance, who at least *seem* to undergo pains that are not painful, may have a deficit of either or both feature—thereby possibly requiring distinct treatments. To lump them under one heading 'pain asymbolic' may well be inappropriate—and supported by an overly-simplistic model of painfulness. So too, people with chronic pain, at least *seem* to undergo painful episodes in the absence of any explanatory stimuli. It may be that improved treatment is in the offing by targeting *one* of the features identified here, as against lumping them all together. Besides these 'abnormal' pain conditions, even the treatment of paradigmatic pains may be similarly susceptible to improvement. One goal of pain treatment is to make pains 'less painful'. If the unpleasantness and motivational *oomph* of painful episodes are

[7] Similar considerations may apply to more emotional episodes, e.g. jealousy and grief. As it is controversial whether these episodes are painful, I have set them aside.

dissociable features, then preferentially targeting one or the other of them may be reasonably expected to advance treatment efficacy.

The Pain Project
Philosophy, University of Glasgow

References

Aydede, M. and Fulkerson, M. Forthcoming: Perceptual affect: a critique and a proposal.

Bain, D. 2011: The imperative view of pain, *Journal of Consciousness Studies*, 18, 164–85.

Bain, D. Forthcoming: What makes pain unpleasant? *Philosophical Studies*.

Berridge, K. 2003: Pleasures of the brain. *Brain and Cognition*, 52, 106–28.

Berridge, K. 2004: Motivation concepts in behavioral neuroscience. *Physiology and Behavior*, 81, 179–209.

Berridge, K. and Robinson, T. 2003: Parsing reward. *Trends in Neuroscience*, 26, 507–13.

Cabanac, M. 1979: Sensory pleasure. *The Quarterly Review of Biology*, 54, 1–29.

Colombetti, G. 2005: Appraising valence. *Journal of Consciousness Studies*, 12, 103–26.

Faure, A., Richard, J. and Berridge, K. 2010: Desire and dread from the nucleus accumbens: cortical glutamate and subcortical GABA differentially generate motivation and hedonic impact in the rat. *PLoS ONE*, 5, e11223.

Hall, R. 1989: Are pains necessarily unpleasant? *Philosophy and Phenomenological Research*, 49, 643–59.

Klein, C. Forthcoming: What pain asymbolia really shows.

McClure, S., Daw, N. and Montague, P. 2003: A computational substrate for incentive salience. *Trends in Neuroscience*, 26, 423–28.

Melzack, R. and Wall, P. 2008: *The Challenge of Pain*, 2nd edn. 1988. Reprint. Harmondsworth: Penguin Books.

Panskepp, J. 1998: *Affective Neuroscience: The Foundations of Human and Animal Emotions*. New York: Oxford University Press.

Peciña, S., Cagniard, B., Berridge, K., Aldridge, J. and Zhuang, X. 2003: Hyperdopaminergic mutant mice have higher wanting but not liking for sweet rewards. *The Journal of Neuroscience*, 23, 9395–9402.

Prinz, J. 2010: For valence. *Emotion Review*, 2, 5–13.

Rolls, E. 1999: *The Brain and Emotion*. New York: Oxford University Press.

Schroeder, T. 2004: *Three Faces of Desire*. New York: Oxford University Press.

Schultz, W. 2002: Getting formal with dopamine and reward. *Neuron*, 36, 241–63.

Solomon, R. 2003: Against valence (positive and negative emotions). In *his* Not Passion's Slave: Emotions and Choices. New York: Oxford University Press.